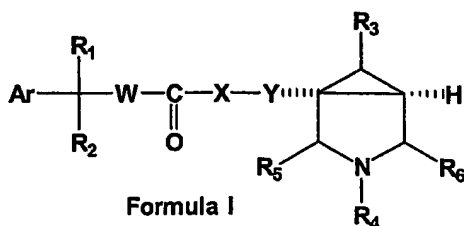


## We Claim

1. Compounds having the structure of Formula I



and their pharmaceutically acceptable salts, pharmaceutically acceptable solvates, esters, enantiomers, diastereomers, N-oxides, polymorphs, or metabolites, wherein

Ar represents an aryl or a heteroaryl ring having 1-2 hetero atoms selected from the group consisting of oxygen, sulphur and nitrogen atoms, the aryl or heteroaryl rings may be unsubstituted or substituted by one to three substituents independently selected from lower alkyl (C<sub>1</sub>-C<sub>4</sub>), lower perhaloalkyl (C<sub>1</sub>-C<sub>4</sub>), cyano, hydroxy, nitro, halogen (e.g. F, Cl, Br, I), lower alkoxy (C<sub>1</sub>-C<sub>4</sub>), lower perhaloalkoxy (C<sub>1</sub>-C<sub>4</sub>), unsubstituted amino, N-lower alkylamino (C<sub>1</sub>-C<sub>4</sub>) or N-lower alkylamino carbonyl (C<sub>1</sub>-C<sub>4</sub>);

R<sub>1</sub> represents a hydrogen, hydroxy, hydroxymethyl, amino, alkoxy, carbamoyl or halogen (e.g. fluorine, chlorine, bromine and iodine);

R<sub>2</sub> represents hydrogen, alkyl, C<sub>3</sub>-C<sub>7</sub> cycloalkyl ring, a C<sub>3</sub>-C<sub>7</sub> cycloalkenyl ring, an aryl or a heteroaryl ring having 1-2 hetero atoms selected from the group consisting of oxygen, sulphur and nitrogen atoms, the aryl or a heteroaryl ring may be unsubstituted or substituted by one to three substituents independently selected from lower alkyl (C<sub>1</sub>-C<sub>4</sub>), cyano, hydroxy, nitro, lower alkoxycarbonyl, halogen, lower alkoxy (C<sub>1</sub>-C<sub>4</sub>), lower perhaloalkoxy (C<sub>1</sub>-C<sub>4</sub>), unsubstituted amino, N-lower alkylamino (C<sub>1</sub>-C<sub>4</sub>), N-lower alkyl amino carbonyl (C<sub>1</sub>-C<sub>4</sub>);

W represents (CH<sub>2</sub>)<sub>p</sub>, where p represents 0 to 1;

X represents an oxygen, sulphur, -NR or no atom, wherein R represents H or alkyl;

Y represents (CH<sub>2</sub>)<sub>q</sub> wherein q represents 0 to 1;

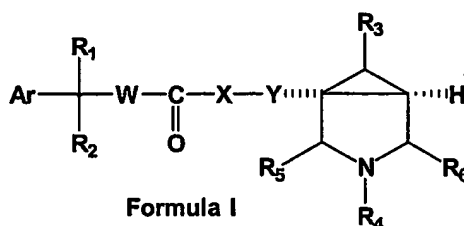
29 R<sub>3</sub>, R<sub>5</sub> and R<sub>6</sub> are independently selected from H, lower alkyl, COOH, CONH<sub>2</sub>,  
 30 NH<sub>2</sub>, CH<sub>2</sub>NH<sub>2</sub>; and

31 R<sub>4</sub> represents hydrogen, C<sub>1</sub>-C<sub>15</sub> saturated or unsaturated aliphatic hydrocarbon  
 32 (straight chain or branched) in which any 1 to 6 hydrogen atoms may be  
 33 substituted with the group independently selected from halogen, arylalkyl,  
 34 arylalkenyl, heteroarylalkyl or heteroarylalkenyl, having 1-2 hetero atoms selected  
 35 from the group consisting of nitrogen, oxygen and sulphur atoms with an option  
 36 that any 1 to 3 hydrogen atoms on the ring in said arylalkyl, arylalkenyl,  
 37 heteroarylalkyl, heteroarylalkenyl group may be substituted with lower alkyl (C<sub>1</sub>-  
 38 C<sub>4</sub>), lower perhaloalkyl (C<sub>1</sub>-C<sub>4</sub>), cyano, hydroxy, nitro, lower alkoxy, carbonyl,  
 39 halogen, lower alkoxy (C<sub>1</sub>-C<sub>4</sub>), lower perhalo alkoxy (C<sub>1</sub>-C<sub>4</sub>), unsubstituted amino,  
 40 N-lower alkylamino (C<sub>1</sub>-C<sub>4</sub>), or N-lower alkylamino carbonyl (C<sub>1</sub>-C<sub>4</sub>).

1 2. A compound selected from the group consisting of  
 2 (1 $\alpha$ , 5 $\alpha$ )-[3-benzyl-3-azabicyclo[3.1.0]-hex-1-(methyl)-yl]-2-hydroxy-2,2-  
 3 diphenylcarboxylic ester (Compound No.1)  
 4 (1 $\alpha$ , 5 $\alpha$ )-[3-benzyl-3-azabicyclo[3.1.0]-hex-1-(methyl)-yl]-2-hydroxy-2-cyclohex  
 5 yl-2-phenylcarboxylic ester (Compound No.2)  
 6 (1 $\alpha$ , 5 $\alpha$ )-[3-benzyl-3-azabicyclo[3.1.0]-hex-1-(methyl)-yl]-2-hydroxy-2-  
 7 cyclopentyl-2-phenylcarboxylic ester (Compound No.3)  
 8 (1 $\alpha$ , 5 $\alpha$ )-[3-benzyl-3-azabicyclo[3.1.0]-hex-1-yl]-2-hydroxymethyl-2-  
 9 phenylacetamide (Compound No.4)  
 10 (1 $\alpha$ , 5 $\alpha$ )-[3-benzyl-3-azabicyclo [3.1.0]-hex-1-yl]-2-hydroxy-2,2-  
 11 diphenylacetamide (Compound No.5)  
 12 (1 $\alpha$ , 5 $\alpha$ )-[3-(2-methyl-2-pentenyl)-3-azabicyclo[3.1.0]-hex-1-(methyl)-yl]-2-  
 13 hydroxy-2-cyclohexyl-2-phenylcarboxylic ester (Compound No.6)  
 14 (1 $\alpha$ , 5 $\alpha$ )-[3-(3,4-methylenedioxyphenyl)-3-azabicyclo[3.1.0]-hex-1-(methyl)-  
 15 yl]-2-hydroxy-2-cyclohexyl-2-phenylcarboxylic ester (Compound No.7).

1 3. A pharmaceutical composition comprising a therapeutically effective amount of a  
 2 compound as defined in claim 1 or 2 optionally together with pharmaceutically  
 3 acceptable carriers, excipients or diluents.

- 1 4. A method for treatment or prophylaxis of an animal or a human suffering from a  
 2 disease or disorder of the respiratory, urinary and gastrointestinal systems, wherein  
 3 the disease or disorder is mediated through muscarinic receptors, comprising  
 4 administering to said animal or human, a therapeutically effective amount of a  
 5 compound having the structure of Formula I,



13 and its pharmaceutically acceptable salts, pharmaceutically acceptable solvates,  
 14 esters, enantiomers, diastereomers, N-oxides, polymorphs, metabolites, wherein  
 15 Ar represents an aryl or a heteroaryl ring having 1-2-hetero atoms selected from  
 16 the group consisting of oxygen, sulphur and nitrogen atoms, the aryl or heteroaryl  
 17 rings may be unsubstituted or substituted by one to three substituents independently  
 18 selected from lower alkyl (C<sub>1</sub>-C<sub>4</sub>), lower perhaloalkyl (C<sub>1</sub>-C<sub>4</sub>), cyano, hydroxy,  
 19 nitro, halogen (e.g. F, Cl, Br, I), lower alkoxy (C<sub>1</sub>-C<sub>4</sub>), lower perhaloalkoxy (C<sub>1</sub>-  
 20 C<sub>4</sub>), unsubstituted amino, N-lower alkylamino (C<sub>1</sub>-C<sub>4</sub>) or N-lower alkylamino  
 21 carbonyl (C<sub>1</sub>-C<sub>4</sub>);

22 R<sub>1</sub> represents a hydrogen, hydroxy, hydroxymethyl, amino, alkoxy, carbamoyl or  
 23 halogen (e.g. fluorine, chlorine, bromine and iodine);

24 R<sub>2</sub> represents hydrogen, alkyl, C<sub>3</sub>-C<sub>7</sub> cycloalkyl ring, a C<sub>3</sub>-C<sub>7</sub> cycloalkenyl ring, an  
 25 aryl or a heteroaryl ring having 1-2 hetero atoms selected from the group  
 26 consisting of oxygen, sulphur and nitrogen atoms, the aryl or a heteroaryl ring may  
 27 be unsubstituted or substituted by one to three substituents independently selected  
 28 from lower alkyl (C<sub>1</sub>-C<sub>4</sub>), cyano, hydroxy, nitro, lower alkoxy, lower alkoxy carbonyl, halogen,  
 29 lower alkoxy (C<sub>1</sub>-C<sub>4</sub>), lower perhaloalkoxy (C<sub>1</sub>-C<sub>4</sub>), unsubstituted amino, N-lower  
 30 alkylamino (C<sub>1</sub>-C<sub>4</sub>), N-lower alkyl amino carbonyl (C<sub>1</sub>-C<sub>4</sub>);

31 W represents (CH<sub>2</sub>)<sub>p</sub>, where p represents 0 to 1;

32 X represents an oxygen, sulphur, -NR or no atom, wherein R represents H or alkyl;

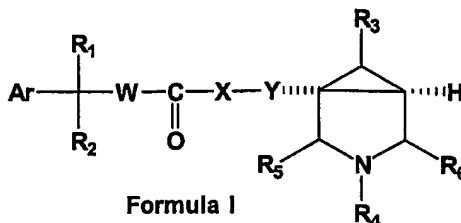
33 Y represents (CH<sub>2</sub>)<sub>q</sub> wherein q represents 0 to 1;  
34 R<sub>3</sub>, R<sub>5</sub> and R<sub>6</sub> are independently selected from H, lower alkyl, COOH, CONH<sub>2</sub>,  
35 NH<sub>2</sub>, CH<sub>2</sub>NH<sub>2</sub>; and  
36 R<sub>4</sub> represents hydrogen, C<sub>1</sub>-C<sub>15</sub> saturated or unsaturated aliphatic hydrocarbon  
37 (straight chain or branched) in which any 1 to 6 hydrogen atoms may be  
38 substituted with the group independently selected from halogen, arylalkyl,  
39 arylakenyl, heteroarylalkyl or heteroarylalkenyl, having 1-2 hetero atoms selected  
40 from the group consisting of nitrogen, oxygen and sulphur atoms with an option  
41 that any 1 to 3 hydrogen atoms on an aryl or heteraryl ring in the arylalkyl,  
42 arylalkenyl, heteroarylalkyl, heteroarylalkenyl group may be substituted with  
43 lower alkyl (C<sub>1</sub>-C<sub>4</sub>), lower perhaloalkyl (C<sub>1</sub>-C<sub>4</sub>), cyano, hydroxy, nitro, lower  
44 alkoxy, carbonyl, halogen, lower alkoxy (C<sub>1</sub>-C<sub>4</sub>), lower perhalo alkoxy (C<sub>1</sub>-C<sub>4</sub>),  
45 unsubstituted amino, N-lower alkylamino (C<sub>1</sub>-C<sub>4</sub>), N-lower alkylamino carbonyl  
46 (C<sub>1</sub>-C<sub>4</sub>).

1 5. The method according to claim 4 wherein the disease or disorder is urinary  
2 incontinence, lower urinary tract symptoms (LUTS), bronchial asthma, chronic  
3 obstructive pulmonary disorders (COPD), pulmonary fibrosis, irritable bowel  
4 syndrome, obesity, diabetes or gastrointestinal hyperkinesis.

1 6. The method for treatment or prophylaxis of an animal or a human suffering from a  
2 disease of the respiratory, urinary and gastrointestinal systems, wherein the disease  
3 or disorder is mediated through muscarinic receptors, comprising administering to  
4 said animal or human, a therapeutically effective amount of the pharmaceutical  
5 composition according to claim 3.

1 7. The method according to claim 6 wherein the disease or disorder is urinary  
2 incontinence, lower urinary tract symptoms (LUTS), bronchial asthma, chronic  
3 obstructive pulmonary disorders (COPD), pulmonary fibrosis, irritable bowel  
4 syndrome, obesity, diabetes and gastrointestinal hyperkinesis.

1 8. A process for preparing compounds of Formula I,



8  
9 and their pharmaceutically acceptable salts, pharmaceutically acceptable solvates,  
10 esters, enantiomers, diastereomers, N-oxides, polymorphs, metabolites, wherein  
11 Ar represents an aryl or a heteroaryl ring having 1-2-hetero atoms selected from  
12 the group consisting of oxygen, sulphur and nitrogen atoms, the aryl or heteroaryl  
13 rings may be unsubstituted or substituted by one to three substituents independently  
14 selected from lower alkyl (C<sub>1</sub>-C<sub>4</sub>), lower perhaloalkyl (C<sub>1</sub>-C<sub>4</sub>), cyano, hydroxy,  
15 nitro, halogen (e.g. F, Cl, Br, I), lower alkoxy (C<sub>1</sub>-C<sub>4</sub>), lower perhaloalkoxy (C<sub>1</sub>-  
16 C<sub>4</sub>), unsubstituted amino, N-lower alkylamino (C<sub>1</sub>-C<sub>4</sub>) or N-lower alkylamino  
17 carbonyl (C<sub>1</sub>-C<sub>4</sub>);

18 R<sub>1</sub> represents a hydrogen, hydroxy, hydroxymethyl, amino, alkoxy, carbamoyl or  
19 halogen (e.g. fluorine, chlorine, bromine and iodine);

20 R<sub>2</sub> represents hydrogen, alkyl, C<sub>3</sub>-C<sub>7</sub> cycloalkyl ring, a C<sub>3</sub>-C<sub>7</sub> cycloalkenyl ring, an  
21 aryl or a heteroaryl ring having 1-2 hetero atoms selected from the group  
22 consisting of oxygen, sulphur and nitrogen atoms, the aryl or a heteroaryl ring may  
23 be unsubstituted or substituted by one to three substituents independently selected  
24 from lower alkyl (C<sub>1</sub>-C<sub>4</sub>), cyano, hydroxy, nitro, lower alkoxy, carbonyl, halogen,  
25 lower alkoxy (C<sub>1</sub>-C<sub>4</sub>), lower perhaloalkoxy (C<sub>1</sub>-C<sub>4</sub>), unsubstituted amino, N-lower  
26 alkylamino (C<sub>1</sub>-C<sub>4</sub>), N-lower alkyl amino carbonyl (C<sub>1</sub>-C<sub>4</sub>);

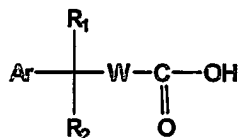
27 W represents (CH<sub>2</sub>)<sub>p</sub>, where p represents 0 to 1;

28 X represents an oxygen, sulphur, -NR or no atom, wherein R represents H or alkyl;

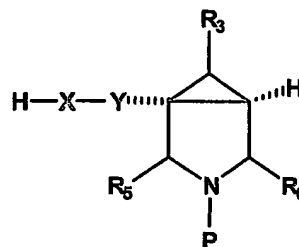
29 Y represents (CH<sub>2</sub>)<sub>q</sub> wherein q represents 0 to 1;

- 30  $R_3, R_5$  and  $R_6$  are independently selected from H, lower alkyl, COOH, CONH<sub>2</sub>,  
 31 NH<sub>2</sub>, CH<sub>2</sub>NH<sub>2</sub>; and
- 32  $R_4$  represents hydrogen, C<sub>1</sub>-C<sub>15</sub> saturated or unsaturated aliphatic hydrocarbon  
 33 (straight chain or branched) in which any 1 to 6 hydrogen atoms may be  
 34 substituted with the group independently selected from halogen, arylalkyl,  
 35 arylalkenyl, heteroarylalkyl or heteroarylalkenyl, having 1-2 hetero atoms selected  
 36 from the group consisting of nitrogen, oxygen and sulphur atoms with an option  
 37 that any 1 to 3 hydrogen atoms on an aryl or heteroaryl ring in said arylalkyl,  
 38 arylalkenyl, heteroarylalkyl, heteroarylalkenyl group may be substituted with  
 39 lower alkyl (C<sub>1</sub>-C<sub>4</sub>), lower perhaloalkyl (C<sub>1</sub>-C<sub>4</sub>), cyano, hydroxy, nitro, lower  
 40 alkoxy, carbonyl, halogen, lower alkoxy (C<sub>1</sub>-C<sub>4</sub>), lower perhalo alkoxy (C<sub>1</sub>-C<sub>4</sub>),  
 41 unsubstituted amino, N-lower alkylamino (C<sub>1</sub>-C<sub>4</sub>), N-lower alkylamino carbonyl  
 42 (C<sub>1</sub>-C<sub>4</sub>),
- 43 comprising

- 44 (a) reacting a compound of Formula II with a compound of Formula III

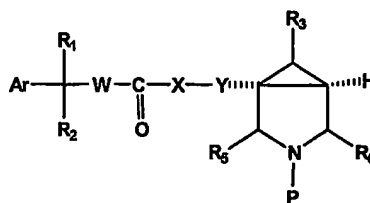


Formula II



Formula III

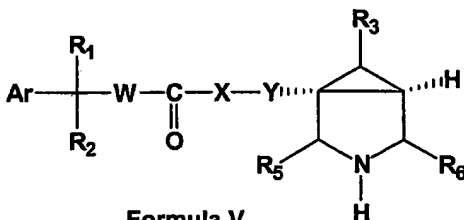
- 45 in the presence of a condensing agent to give a compound of Formula IV,  
 46



Formula IV

47

- 48 (b) deprotecting the compound of Formula IV with a deprotecting agent to give  
49 a compound of Formula V, and



- 53 (c) N-alkylating or benzylating the compound of Formula V with a compound  
54 of Formula LR<sub>4</sub>, wherein L is a leaving group, to give compounds of  
55 Formula I.

- 1 9. The process according to claim 8 wherein P is selected from the group consisting  
2 of benzyl and t-butyloxy carbonyl groups.
- 1 10. The process according to claim 8 wherein the reaction of a compound of Formula  
2 III with a compound of Formula II to give compounds of Formula IV is carried out  
3 in the presence of a condensing agent which is selected from the group consisting  
4 of 1-(3-dimethyl aminopropyl)-3-ethyl carbodiimide hydrochloride (EDC) and 1,8-  
5 diazabicyclo[5.4.0]undec-7-ene (DBU).
- 1 11. The process according to claim 8 wherein the reaction of a compound of Formula  
2 III with a compound of Formula II to give compounds of Formula IV is carried out  
3 in a suitable solvent selected from the group consisting of N,N-  
4 dimethylformamide, dimethylsulfoxide, toluene and xylene.
- 1 12. The process according to claim 8 wherein the reaction of a compound of Formula  
2 II with a compound of Formula III is carried out at temperatures ranging from  
3 about 0°C to about 140°C.
- 1 13. The process according to claim 8 wherein the deprotection of a compound of  
2 Formula IV to give compounds of Formula V is carried out with a deprotecting  
3 agent selected from the group consisting of palladium on carbon, trifluoroacetic  
4 acid (TFA) and hydrochloric acid.
- 1 14. The process according to claim 8 wherein the deprotection of a compound of  
2 Formula IV to give compounds of Formula V is carried out in a suitable solvent

- 3           selected from the group consisting of methanol, ethanol, tetrahydrofuran and  
4           acetonitrile.
- 1   15.    The process according to claim 8 wherein the N-alkylation or benzylation of a  
2           compound of Formula V to give compounds of Formula I is carried out with a  
3           suitable alkylating or benzylating agent, L-R<sub>4</sub> wherein L is any leaving group and  
4           R<sub>4</sub> is as defined earlier.
- 1   16.    The process according to claim 15 wherein the leaving group L is selected from the  
2           group consisting of halogen, O-mestyl and O-tosyl groups.
- 1   17.    The process according to claim 15 wherein the N-alkylation or benzylation of a  
2           compound of Formula V to give compounds of Formula I is carried out in a  
3           suitable organic solvent selected from the group consisting of N,N-  
4           dimethylformamide, dimethylsulfoxide, tetrahydrofuran and acetonitrile.